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Worksite Neighborhood and Obesogenic Behaviors: Findings Among Employees in the Promoting Activity and Changes in Eating (PACE) Trial

Wendy E. Barrington, PhD, Shirley A. A. Beresford, PhD, Thomas D. Koepsell, PhD, Glen E. Duncan, PhD, and Anne Vernez Moudon, DresSc

School of Nursing (Barrington), School of Public Health (Barrington, Beresford, Koepsell, Duncan, Vernez Moudon), College of Built Environments (Vernez Moudon), University of Washington; and the Fred Hutchinson Cancer Research Center (Beresford), Division of Public Health Sciences, Seattle, Washington

Abstract

Background—Understanding mechanisms linking neighborhood context to health behaviors may provide targets for increasing lifestyle intervention effectiveness. Although associations between home neighborhood and obesogenic behaviors have been studied, less is known about the role of worksite neighborhood.

Purpose—To evaluate associations between worksite neighborhood context at baseline (2006) and change in obesogenic behaviors of adult employees at follow-up (2007–2009) in a worksite randomized trial to prevent weight gain.

Methods—Worksite property values were used as an indicator of worksite neighborhood socioeconomic status (NSES). Worksite neighborhood built environment attributes associated with walkability were evaluated as explanatory factors in relationships among worksite NSES, diet, and physical activity behaviors of employees. Behavioral data were collected at baseline (2005–2007) and follow-up (2007–2009). Multilevel linear and logistic models were constructed adjusting for covariates and accounting for clustering within worksites. Product-of-coefficients methods were used to assess mediation. Analyses were performed after study completion (2011–2012).

Results—Higher worksite NSES was associated with more walking (OR=1.16, 95% CI=1.03, 1.30, $p=0.01$). Higher density of residential units surrounding worksites was associated with more walking and eating five daily servings of fruits and vegetables, independent of worksite NSES. Residential density partially explained relationships among worksite NSES, fruit and vegetable consumption, and walking.

Address correspondence to: Wendy E. Barrington, PhD, University of Washington School of Nursing, 1959 Pacific Ave NE, Box 357263, Seattle WA 98195. wendybar@uw.edu..

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Conclusions—Worksite neighborhood context may influence employees' obesogenic behaviors. Furthermore, residential density around worksites could be an indicator of access to dietary and physical activity-related infrastructure in urban areas. This may be important given the popularity of worksites as venues for obesity prevention efforts.

Introduction

Research has linked neighborhood SES (NSES) to rates of obesity¹⁻⁵ and weight gain.⁶ Such analyses have drawn needed attention to geographic disparities, yet explanatory pathways are needed to guide efforts for intervention. Neighborhood built environment attributes, defined as structures and systems resulting from human activity, may possibly mediate relationships between NSES and obesity-related behaviors (Figure 1). Built environment attributes associated with obesity and related behaviors have been used to describe the “walkability” of a neighborhood—the presence of infrastructure that supports walking, including street connectivity (i.e., density of intersections) and availability of destinations (i.e., density of residential and retail/commercial units).⁷ Neighborhoods with higher SES tend to be more walkable, perhaps owing to greater generation of tax revenue in these areas to fund the building and maintenance of these attributes. Analyses linking these relationships could estimate reductions in broader-level socioeconomic disparities attributable to changing built environments through policy⁸ as well as provide further evidence for land-use practices as promising obesity intervention strategies.^{9,10}

Studies have suggested that residents of low-SES neighborhoods eat fewer fruits and vegetables,¹¹ eat more fast food meals, and are less active than individuals in high-SES neighborhoods.^{12,13} Lack of access to healthy food and opportunities for physical activity may explain some of these associations; low-income and minority neighborhoods tend to have fewer supermarkets, more fast food outlets, and less activity-related infrastructure.¹⁴⁻¹⁶ Individuals who live in neighborhoods with greater density of supermarkets have been shown to eat more fruits and vegetables in earlier studies,¹⁷ although these findings are less consistent across more recent studies.¹⁸ Categorization of grocery stores as healthy food outlets is becoming more controversial, however, given the growing prevalence of in-store high-fat quick-serve food options (e.g., fried deli foods, premade side-dishes) and venues (e.g., Starbucks).¹⁹ The presence of fast food restaurants may encourage unhealthy eating, as these venues offer energy-dense, but nutrient-poor, foods at a very low price.^{20,21} Fast food restaurants in neighborhoods have been associated with higher energy and percentage fat intake, higher consumption of fast food and soft drinks, and lower intake of fruits and vegetables in some,²²⁻²⁴ but not all,¹⁵ studies.

Several neighborhood built environment attributes have emerged in the literature that influence physical activity behaviors, including: greater street connectivity, more diverse land-use mix (i.e., combination of retail, commercial, and residential units), and greater access to recreational facilities.²⁵ Yet, neighborhood built environment features may have differential effects on specific domains of physical activity. Density of fitness centers has been more strongly related to moderate and vigorous leisure-time physical activity than walking,²⁶⁻²⁸ although some studies have reported these latter associations.^{16,29,30} Walking for transportation has been more strongly related to street connectivity and proximity to

retail destinations, while walking for exercise has been found to be more associated with the number of parks in the neighborhood.^{31,32}

Evaluating other place-based influences of obesogenic behaviors is needed given that people do not remain in one location throughout the day. Worksite context may also be relevant to individual behavior,³³ given that approximately 60% of the adult population is employed.³⁴ Factors describing the worksite internal environment (i.e., organizational culture and facilities) have been associated with employee health³⁵ and have more recently been inserted within obesity prevention efforts with some effect on employee behaviors.³⁶ These factors include: access to fitness centers (either onsite or via reduced gym memberships); availability of healthy food choices in cafeterias, vending machines, and catered events; accessible stairwells; and support for engaging in healthy-weight behaviors via obesity-prevention programming and incentives.³⁵ Yet, the worksite neighborhood environment may also play a role in the risk of obesity among adults.^{37,38} A review³⁹ of studies examining relationships between neighborhood context and cardiometabolic risk factors estimated that only 6% of included studies assessed the influence of non-residential geographic exposures.

To address a gap in the literature, this study evaluated longitudinal relationships among worksite NSES, worksite neighborhood built environment attributes, and individual-level obesity behaviors among adults. Worksite NSES was hypothesized to be associated with fruit and vegetable intake, fast food meal consumption, soft drink intake, and physical activity and walking behaviors among employees independent of individual-level SES. Furthermore, it was hypothesized that these associations were mediated by neighborhood built environment attributes relative to worksites, including: residential units, food outlets, physical activity destinations, and intersections (Figure 1).

Methods

Study Design and Participants

The Promoting Activity and Changes in Eating (PACE) study was a group-randomized trial of an intervention to prevent weight gain. Smaller worksites in the Seattle area were identified using U.S. Standard Industrial Classification codes. Blue-collar worksites included: manufacturing, transportation and utilities, and distribution. White-collar worksites included: personal, professional, and unclassified services. Worksite eligibility criteria included: having a high proportion of sedentary employees (>25%), low turnover rate during the previous 2 years (<30%), and a low proportion of non-English speaking employees (<30%). Thirty-four worksites (each employing between 100 and 250 people) agreed to participate and were randomized to intervention or control with delayed intervention after study completion. Serial cross-sectional samples of employees were selected at baseline and 2-year follow-up. Baseline surveys were administered to approximately 2,900 total employees between 2005 and 2007. Thirty-three worksites (approximately 2,400 total employees) completed follow-up surveys between 2007 and 2009. Surveys queried for dietary and physical activity behaviors, height, weight, and demographic information. Surveys were given to all employees for worksites with 150 employees or less while a random subsample of 125 employees were given the survey for

worksites with greater than 150 employees.⁴⁰ Of employees who completed the baseline survey, 1,338 (45%) were still employed at the worksite and completed the follow-up survey. Built environment attributes of PACE worksites were assessed at baseline using reported worksite address. Because built environment data were only available for King County, seven worksites were excluded ($n=238$) from this analysis. People with missing data on age, race, and household income ($n=93$) were excluded from the analysis, resulting in a total sample of 1,007 employees within 26 worksites. The University of Washington and Fred Hutchinson Cancer Center IRBs reviewed and approved all study protocols and materials.

Measures

Worksite NSES was constructed using the appraised worksite property value.⁴¹ Although specific to the land parcel of the worksite, assessed property values are similar for properties with comparable characteristics in the same area location.⁴² Data from the 2006 tax year were selected to correspond to the timing of PACE baseline data collection and were linked via worksite address. This measure served as a worksite-level value for each employee and is similar to studies relating health outcomes to the appraised property value of the home.^{41,43}

Worksite neighborhood was defined by geocoding the worksite address and forming a concentric circle with a 0.5-mile radius. The density of intersections and food and physical activity destinations were enumerated within this buffer using geospatial data from University of Washington's Urban Form Lab. Categorizations of food destinations extracted included: food stores (including broad-selection groceries and specialty produce markets), convenience stores, dine-in restaurants, and fast food restaurants.³⁴ Other selected built environment attribute density measures included the number of: three- or four-way street intersections, residential units, parks, fitness destinations (e.g., tennis courts, pools, private gym facilities). All destinations were geocoded by address and verified via cross-checking with online business directories or King County records.

Average fruit and vegetable servings, number of fast food meals, and soft drink intake have been associated with estimated energy intake and obesity in several studies.⁴⁴⁻⁴⁸ The average number of fruit and vegetable servings eaten per day by participants was assessed via the National Cancer Institute's 5-A-Day fruit and vegetable assessment tool.⁴⁴ The number of servings derived was dichotomized using a threshold set at the 75th percentile of intake, which coincided with current dietary guidelines of eating five or more servings of fruits and vegetables per day.^{14,49} Frequency of fast food meals was assessed using a single question (i.e., Thinking about how often you eat out, how many times in a week or month do you eat breakfast, lunch, or dinner in a place such as McDonald's, Burger King, Wendy's, Arby's, Pizza Hut, or Kentucky Fried Chicken?).^{22,46,50} Responses were given as number of times per week and dichotomized at the 75th percentile, equivalent to about one meal per week.^{15,51,52} Average weekly soft drink intake was also assessed by a single question (i.e., How often do you drink soft drinks or soda pop [regular or diet]?). Intake of diet soda was grouped with regular soda intake, as those who tend to drink diet sodas may also be at greater risk for unhealthy weight.⁵³ Response options were: *never, less than once a week,*

*about once a week, two to five times per week, about once a day, and two or more times per day.*²² Responses were dichotomized at the 75th percentile representing between three and four sodas per week.⁵⁴ Although validity of using a single question to assess fast food and soda intake is not available, use of a single question to assess fruit and vegetable intake, albeit underestimated, has demonstrated moderate validity ($r=0.50$ for 24-hour recall).⁵⁵

To capture physical activity possibly performed in the worksite neighborhood, total free-time physical activity of at least 10 minutes in duration was derived from the Godin Leisure-Time Exercise Questionnaire.⁵⁶ The questionnaire estimates frequency of vigorous, moderate, and light exercise and then sums these components to create an intensity-weighted score that corresponds to a MET frequency per week.⁵⁶ To capture moderate and vigorous physical activity (MVPA), a score based on these intensity categories was created⁵⁷ and dichotomized at the 75th percentile (38 METs). This cut-point is roughly 2.5 times greater than “sufficient” MVPA according to current recommendations.⁵⁸ The Godin physical activity score has acceptable reliability ($r=0.69$ to 0.80 for total activity in adults)^{56,59,60} and validity ($r=0.45$ for accelerometer).⁶¹ Total walking was assessed using a single item (i.e., During the last 7 days, on how many days did you walk for *at least 10 minutes at a time?*) based on the International Physical Activity Questionnaire (IPAQ),⁶² which was dichotomized (i.e., *yes* or *no*).^{33,58,63-65}

Individual-level factors evaluated for confounding included: age, gender, race (where “other” also includes: black, Native Alaskan/American Indian, and Pacific Islander/Native Hawaiian), education, and household income. All models of physical activity were adjusted for manual occupation (i.e., machine operators, mechanics/technicians, service workers, tradesmen, or laborer). Worksite-level factors evaluated for confounding included: intervention arm and worksite parcel size (as the specified buffer radius for neighborhood built environment attributes was measured from the parcel centroid) in addition to worksite internal environment variables (i.e., access to stairs, vending machines, Weight Watchers programs, and subsidized gym memberships).

Statistical Analysis

The total association of worksite NSES on dietary and physical activity behaviors was assessed using multilevel logistic models adjusted for covariates as fixed “effects” and including a worksite random “effect.” Then, potential explanatory factors of these relationships were identified using linear regression models to assess neighborhood-level associations between worksite NSES and built environment attributes (i.e., path *a*). Multilevel logistic models were used to evaluate associations between built environment attributes of worksites and obesogenic behaviors adjusting for worksite NSES (i.e., path *b*). To test mediation, currently recommended product-of-coefficients methods were employed involving biased-corrected bootstrapped 95% CIs,⁶⁶ also applicable to multilevel models,⁶⁷ with a continuous mediator and dichotomous outcome.⁶⁸ The equation for the indirect (i.e., mediated) association takes the form $OR \approx \exp[a*b]$; a distribution of $a*b$ was generated by sampling the data with replacement, simultaneously running path *a* and path *b* regression equations, and forming their product 1,000 times (i.e., bootstrapping). The mediated association and the bias-corrected upper and lower bounds of 95% CIs were exponentiated;

the OR is considered statistically significant if the CI does not include one. The percentage mediated for multiplicative models was also calculated.⁶⁹ All statistical analyses were performed after study completion (2011–2012) using Stata SE, version 12.1 (StataCorp LP, College Station TX).

Results

Baseline worksite neighborhood built environment attributes as well as individual-level demographic characteristics and obesogenic behaviors at follow-up are summarized in Table 1. In addition, 11 of 26 (42.3%) worksites were blue collar and approximately 25% of employees were obese. Table 2 reports ORs and 95% CIs for dietary behaviors corresponding to a difference commensurate with moving from the 25th percentile to the 75th percentile of the distribution of worksite NSES. Identified covariates included in models are listed in table footnotes. The ORs and 95% CIs relating worksite NSES to physical activity behaviors are similarly presented in Table 3. Although worksite NSES was not associated with selected dietary behaviors, worksite NSES was significantly associated with more walking at follow-up in the fully adjusted model. Table 4 reports ORs and 95% CIs for dietary behaviors corresponding to a difference commensurate with moving from the 25th percentile to the 75th percentile of the distribution of built environment attributes. Similarly, associations between worksite neighborhood built environment attributes and walking and leisure-time MVPA are shown in Table 5. Residential density was significantly associated with eating five or more servings of fruits and vegetables per day after adjustment for worksite NSES, whereas there were no significant associations between worksite neighborhood built environment attributes and other dietary behaviors ($p>0.05$). All four measures of the worksite neighborhood built environment were significantly associated with walking for 10 or more minutes in the past week. However, residential density was the only attribute that remained significantly associated with walking behavior after adjustment for worksite NSES.

Associations of worksite NSES with worksite neighborhood built environment attributes hypothesized to mediate relationships with physical activity and dietary behaviors are presented in Table 6. Higher worksite NSES was associated with correlates of walkability and access to physical activity and food-related services. Mediation analyses suggested that higher worksite NSES acted via higher residential density to increase fruit and vegetable consumption as well as walking behavior of employees (Table 7). The association between worksite NSES and fruit and vegetable consumption was completely mediated by residential density in these data, while residential density mediated approximately 27% of the association between worksite NSES and walking (data not shown).

Discussion

This study found that the worksite neighborhood context was associated with more walking. This has public health implications given that a large segment of the adult population works and potentially spends a significant portion of its waking hours in this environment.³⁴ Worksite NSES was positively correlated with worksite neighborhood built environment attributes associated with walkability. Providing environments that support walking may be

key to more widespread adoption of physical activity behaviors through active living (e.g., walking to and from work, stores, and parks).⁷⁰ These study findings are consistent with others linking higher SES of home neighborhoods with higher frequency of walking¹⁰ and now extend those findings to the worksite neighborhood. Other literature suggests that higher SES of home neighborhoods may influence walking levels through better perceptions of neighborhood, greater numbers of walking destinations, and better pedestrian infrastructure than lower-SES home neighborhoods that together create an environment supportive of walking.^{10,71} In this study, the statistically significant association between worksite NSES and walking was partly mediated by residential density. If density is an indicator of infrastructure and destinations supportive of walking, these findings may suggest that these relationships could translate to the worksite neighborhood as well.

There were no demonstrated associations between worksite NSES and other obesity-related behavior in these analyses. Although it has been thought that mediation may only be assessed when there is a significant total association between the predictor and outcome, recent methodological research suggests that mediation analyses are still valid so long as there is a significant relationship between the proposed mediator and outcome.⁶⁶ This is salient when assessing mechanisms for neighborhood factors on behaviors as competing associations may exist that result in an overall null association. Here, residential density was found to be independently associated with fruit and vegetable intake as well as to completely mediate the relationship between worksite NSES and fruit and vegetable intake.

The association between lower NSES and higher density of fast food outlets around the home^{52,72,73} was not demonstrated in relation to worksites in our study. In addition to these findings, a national study⁴³ found that lower home NSES was actually associated with fewer food outlets of any type. This is also consistent with evidenced clustering of several built environment attributes (i.e., supermarket, retail, and fitness destinations), which was positively related to NSES in three other large metropolitan areas.¹¹ Worksites in lower-SES neighborhoods of Seattle, therefore, appear to be “underserved” in that they are located in less dense areas that are removed from these clusters of built environment attributes that support healthy eating and physical activity.

This study has some limitations. Multiple covariates at both the worksite- and individual-level were included in all models, yet it is still possible that these findings may be subject to residual confounding. Although worksite class (approximated by industrial classification) and baseline factors related to the worksite internal environment did not influence model estimates, these measures may not accurately capture appropriate elements of the worksite internal environment associated with obesogenic behaviors or be subject to measurement error. Although the location of reported total frequencies of obesogenic behaviors is not known, it is possible that a portion of reported behaviors may occur around the worksite either before or after work or during work breaks. Given these study findings, it is possible that associations with behaviors geo-located around the worksite could be stronger.⁷⁴ The strengths of this study include performing a longitudinal analysis and the ability to rule out possible interaction between the predictor and mediators. These findings have added to the paucity of evidence concerning the influence of worksite neighborhood context on

obesogenic behaviors. The application of appraised property value of the worksite is a novel measure of NSES in a commercial context.

In conclusion, residential density around worksites may independently influence dietary and physical activity behaviors of employees as well as partially explain associations between worksite NSES and these behaviors. Consideration of worksite neighborhood contextual characteristics may be one refinement of workplace intervention strategies for obesity prevention.

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Figure 1.
Conceptual model relating worksite neighborhood context to obesogenic behaviors among employees in the PACE trial

Table 1

Mean neighborhood- and individual-level demographic characteristics and behaviors of employees within selected PACE worksites^a

Neighborhood-level	Mean	SD
Worksite NSES ^b	\$546	\$1,204
Residential units ^c	3,824.0	4,017.5
Food destinations ^c	109.9	134.3
Fitness destinations ^c	12.2	8.6
Intersections ^c	193.5	113.8

Individual-level	Percentage	n
Age		
18-34	18.1	182
35-44	29.5	297
45-54	28.5	287
55-65	23.9	241
Male	43.2	459
Race		
White	74.6	751
Asian	14.2	143
Other ^d	11.2	113
Education		
<HS, HS graduate or GED	17.4	181
Some college or technical college	32.5	328
College graduate	34.4	341
Professional degree	15.7	157
Household income		
<\$50,000	28.0	282
\$50,000 to \$74,999	22.7	229
\$75,000 to \$100,000	20.8	209
>\$100,000	28.5	287
Manual occupation	19.7	770
Dietary behaviors		
5+ fruits and vegetables/day	22.5	219
1+ fast food meal/week	30.6	318
3+ soft-drinks/week	13.6	119
Physical activity behaviors		
>38 METs of leisure-time MVPA/day	27.6	260
No walking for 10+ minutes/day	17.3	167

NSES=neighborhood socioeconomic status; MVPA=moderate or vigorous physical activity

^a N = 26 worksites, n = 1,007 employees

^b Worksite NSES presented as baseline property value/feet²

^c Density of built environment attributes calculated within 0.5 mile radius of worksite

^d Category also includes: Black, Native Alaskan/American Indian, and Pacific Islander/Native Hawaiian

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Table 2

Baseline worksite NSES and employee dietary behaviors at 2-year follow-up

	Fruits and vegetables (5+ servings/day)			Fast food meals (1+ meal/week)			Soft-drinks (3+ sodas/week)		
	OR ^a	95% CI	P trend ^b	OR ^a	95% CI	P trend ^b	OR ^a	95% CI	P trend ^b
Age	1.00	0.99, 1.02	0.87	0.98	0.96, 0.99	0.002	0.99	0.97, 1.01	0.37
Male	1.00	0.73, 1.37	0.99	1.32	0.96, 1.82	0.09	0.73	0.41, 1.29	0.28
Race/Ethnicity									
White	1.00	--	--	1.00	--	--	1.00	--	--
Asian	1.61	1.01, 2.56	0.04	0.63	0.38, 1.04	0.08	0.73	0.32, 1.70	0.46
Other ^c	1.26	0.77, 2.04	0.35	1.52	0.95, 2.41	0.08	1.75	0.86, 3.54	0.12
Education			0.05			0.008			0.41
HS graduate	1.00	--		1.00	--		1.00	--	
Some college	0.67	0.42, 1.08		0.73	0.47, 1.14		1.49	0.68, 3.28	
College graduate	0.91	0.55, 1.49		0.63	0.40, 1.01		0.61	0.26, 1.44	
Post graduate	1.65	0.90, 3.03		0.42	0.22, 0.80		1.22	0.44, 3.34	
Income			0.55			0.71			0.35
<\$50,000	1.00	--	--	1.00	--		1.00	--	
\$50,000 to \$74,999	1.09	0.70, 1.68		0.96	0.62, 1.49		1.05	0.52, 2.16	
\$75,000 to \$100,000	0.75	0.47, 1.19		0.73	0.45, 1.18		0.85	0.39, 1.85	
>\$100,000	0.98	0.62, 1.55		0.98	0.62, 1.55		0.71	0.32, 1.57	
Worksite NSES ^d	1.03	0.97, 1.10	0.27	0.95	0.90, 1.01	0.09	1.02	0.96, 1.08	0.41
<i>Random-effects parameters</i>									
Between worksites									
Intercept (variance)	0.23	0.09, 0.57		0			0		

Note: Boldface indicates statistical significance (p<0.05). NSES=neighborhood socioeconomic status

^aOR estimated by multilevel logistic model adjusted for all variables in table, behavior measured at baseline, parcel size, and intervention arm^bWald test for trend^cCategory also includes: Black, Native Alaskan/American Indian, and Pacific Islander/Native Hawaiian^dRatio of odds of outcome commensurate with moving from the 25th %ile to the 75th %ile of the distribution of worksite NSES; P for trend tested using continuous measure of worksite NSES

Table 3

Baseline worksite NSES and employee physical activity at 2-year follow-up

	Walking (10+ mins/day) ^a			Leisure-time MVPA (38+METs/week)		
	OR ^b	95% CI	P trend ^c	OR ^b	95% CI	P trend ^c
Age	1.01	0.99, 1.03	0.34	0.98	0.96, 0.99	0.008
Male	0.53	0.34, 0.81	0.002	1.46	1.04, 2.07	0.03
Race/Ethnicity						
White	1.00	--	--	1.00	--	--
Asian	0.59	0.32, 1.07	0.06	0.86	0.49, 1.54	0.63
Other ^c	0.81	0.43, 1.52	0.51	1.34	0.79, 2.27	0.29
Education			0.64			0.51
HS graduate	1.00	--		1.00	--	
Some college	0.97	0.51, 1.87		1.31	0.73, 2.36	
College graduate	1.01	0.51, 1.99		1.50	0.82, 2.75	
Post graduate	0.75	0.33, 1.72		1.24	0.60, 2.55	
Income			0.16			0.12
<\$50,000	1.00	--		1.00	--	
\$50,000 to \$74,999	0.80	0.45, 1.43		1.01	0.61, 1.68	
\$75,000 to \$100,000	1.11	0.58, 2.11		1.02	0.60, 1.74	
>\$100,000	1.47	0.75, 2.85		1.50	0.90, 2.52	
Manual occupation	1.90	1.02, 3.54	0.04	0.94	0.56, 1.59	0.83
Worksite NSES ^d	1.16	1.03, 1.30	0.01	1.00	0.95, 1.05	0.90
<i>Random-effects parameters</i>						
Between worksites						
Intercept (variance)	0			0.11	0.02, 0.52	

Note: Boldface indicates statistical significance (p<0.05). NSES=neighborhood socioeconomic status; MVPA=moderate or vigorous physical activity

^e Ratio of odds of outcome commensurate with moving from the 25th %ile to the 75th %ile of the distribution of worksite NSES; P for trend tested using continuous measure of worksite NSES

^a Adjusted for individual-level manual occupation

^b OR estimated by multilevel logistic model adjusted for all variables in table, behavior measured at baseline, parcel size, and intervention arm

^c Wald test for trend

^d Category also includes: Black, Native Alaskan/American Indian, and Pacific Islander/Native Hawaiian

Table 4

Worksite built environment attributes and employee dietary behaviors at 2-year follow-up

	Fruits and vegetables (5+ servings/day)			Fast food meals (1+ meal/week)			Soft-drinks (3+ sodas/week)		
	OR ^a	95%CI	value ^b	OR ^a	95%CI	P-value ^b	OR ^a	95%CI	P-value ^b
Residential units									
Model 1 ^c	2.44	(1.34, 4.46)	0.004	0.78	(0.52, 1.20)	0.26	1.25	(0.63, 2.49)	0.52
Model 2 ^d	2.50	(1.27, 4.95)	0.008	0.88	(0.55, 1.40)	0.59	1.30	(0.60, 2.83)	0.50
Food destinations ^e									
Model 1 ^c	1.40	(0.90, 2.17)	0.14	0.80	(0.59, 1.09)	0.16	1.03	(0.66, 1.60)	0.91
Model 2 ^d	1.39	(0.72, 2.70)	0.33	0.89	(0.58, 1.37)	0.60	1.02	(0.51, 2.02)	0.96

Note: Boldface indicates statistical significance (p<0.05).

^a Ratio of odds of outcome commensurate with moving from the 25th %ile to the 75th %ile of the distribution of worksite neighborhood built environment attributes; P for trend tested using continuous measure of worksite built environment attribute^b Wald test^c Adjusted for age, sex, race, education, income, behavior at baseline, worksite parcel size, and intervention arm as fixed effects and a worksite random effect^d Model 1 and worksite NSES^e Includes all restaurant and grocery store types

Table 5

Worksite built environment attributes and employee physical activity at 2-year follow-up

	Walking (10+ mins/day) ^a			Leisure-time MVPA (38+METs/week)		
	OR ^b	95%CI	P value ^c	OR ^b	95%CI	P value ^c
Residential units						
Model 1 ^d	2.45	(1.41, 4.27)	0.001	1.12	(0.66, 1.89)	0.67
Model 2 ^e	1.84	(1.02, 3.33)	0.04	1.26	(0.69, 2.28)	0.45
Food destinations ^f						
Model 1 ^d	1.72	(1.14, 2.60)	0.01			
Model 2 ^e	1.14	(0.65, 2.02)	0.64			
Activity destinations ^g						
Model 1 ^d	1.99	(1.16, 3.40)	0.01	1.07	(0.68, 1.71)	0.76
Model 2 ^e	1.26	(0.65, 2.45)	0.49	1.29	(0.70, 2.38)	0.41
Intersections						
Model 1 ^d	1.61	(1.01, 2.60)	0.047	0.95	(0.62, 1.44)	0.80
Model 2 ^e	1.07	(0.61, 1.87)	0.82	1.02	(0.60, 1.74)	0.95

Note: Boldface indicates statistical significance (p<0.05). NSES=neighborhood socioeconomic status; MVPA=moderate or vigorous physical activity

^a Adjusted for individual-level manual occupation

^b Ratio of odds of outcome commensurate with moving from the 25th %ile to the 75th %ile of the distribution of worksite neighborhood built environment attributes; P for trend tested using continuous measure of worksite built environment attribute

^c Wald test

^d Adjusted for age, sex, race, education, income, manual occupation, measure at baseline, worksite parcel size, and intervention group as fixed effects and a worksite random effect

^e Model 1+ worksite SES

^f Includes all restaurant and grocery store types

^g Includes parks, trails, gyms, golf courses, pools, community centers

Table 6

Worksite NSES and built environment attributes of PACE worksites at baseline

	β^a	95%CI ^b	P value
Residential units	293.7	42.9, 544.5	0.02
Food destinations ^c	21.1	10.8, 31.5	<0.0001
Activity destinations ^d	1.1	0.5, 1.7	0.001
Intersections	12.1	4.2, 19.9	0.004

Note: Boldface indicates statistical significance ($p < 0.05$). NSES=neighborhood socioeconomic status

^a Slope between groups (presented for increase in IQR of worksite SES) estimated by linear regression model adjusted for worksite parcel size

^b Wald test

^c Includes all restaurant and grocery store types

^d Includes parks, trails, gyms, golf courses, pools, community centers

Table 7

Mediation of worksite neighborhood built environment between NSES and employee obesogenic behaviors at 2-year follow-up

	Residential units		Food destinations ^c		Activity destinations ^d		Intersections	
	Exp (<i>a*b</i>) ^e	Exp (95%CI) ^f	Exp (<i>a*b</i>) ^e	Exp (95%CI) ^f	Exp (<i>a*b</i>) ^e	Exp (95%CI) ^f	Exp (<i>a*b</i>) ^e	Exp (95%CI) ^f
Dietary Behaviors								
Fruits and vegetables (5+ servings/day)	1.032	1.011, 1.053	0.998	0.967, 1.024				
Fast food meals (1+ meal/week)	0.995	0.997, 1.017	0.988	0.945, 1.036				
Soft-drinks (3+ sodas/week)	1.011	0.983, 1.054	1.002	0.934, 1.085				
Physical activity Behaviors								
Walking (10+ mins/day) ^g	1.026	1.001, 1.050	1.014	0.960, 1.088	1.015	0.975, 1.060	1.004	0.971, 1.044
Leisure-time MVPA (38+ METs/week)	1.006	0.982, 1.028	0.993	0.945, 1.034	1.011	0.975, 1.045	0.993	0.962, 1.021

Note: Boldface indicates statistical significance (bias-corrected bootstrapped 95% CIs do not overlap 1.000).

a, coefficient for path a of mediation model; *b*, coefficient for path b of mediation model; NSES, neighborhood socioeconomic status; MVPA, moderate or vigorous physical activity

^c Includes all restaurant and grocery store types

^d Includes parks, trails, gyms, golf courses, pools, community centers

^e Estimates obtained via antilogarithm of mean regression coefficient of indirect effect (product of coefficients *a*b*) presented for increase in IQR of worksite SES (path *a*) and 1 unit increase in mediator (path *b*)

^f bias-corrected bootstrapped 95% CIs generated by forming a distribution of *a*b* by bootstrapping path *a* and *b* regressions and taking product of coefficients 1,000 times by sampling data with replacement while accounting for data structure; bias-corrected coefficients for upper and lower bound were exponentiated (to form OR)

^g Adjusted for individual-level manual occupation